

CLAIMS

1. A toner fixing device, comprising:
  - a fixing member;
  - an opposite member formed opposite said fixing member so as to form a nip between said fixing member and said opposite member;
  - a main power source;
  - an electric double-layer capacitor;
  - a charger connecting said electric double-layer capacitor to said main power source;
  - a fixing member heater connected to said electric double-layer capacitor;
  - a switch disposed between said electric double-layer capacitor and said fixing member heater, said switch configured to controllably connect and disconnect said electric double-layer capacitor and said fixing member heater;
  - a fixing member temperature sensor in contact with said fixing member; and
  - a controller configured to control said switch such that said electric double-layer capacitor connects to or disconnects from said heater based on comparing a temperature sensed by said fixing member temperature sensor to a temperature threshold value, wherein a toner image is fixed onto a recording medium passing through said nip.
2. The toner fixing device according to claim 1, wherein said main power source is also connected to said heater.
3. The toner fixing device according to claim 2, said fixing member heater comprising:
  - a first fixing member heater supplied with power from said electric double-layer capacitor; and
  - a second fixing member heater supplied with power from said main power source.
4. A toner fixing device, comprising:
  - a fixing member;
  - an opposite member formed opposite said fixing member so as to form a nip between said fixing member and said opposite member;
  - a main power source;
  - a battery unit;

a charger connecting said battery unit to said main power source;  
a fixing member heater connected to said battery unit;  
a switch disposed between said battery unit and said fixing member heater, said switch configured to controllably connect or disconnect said battery unit and said fixing member heater;  
a fixing member temperature sensor connected to said fixing member; and  
a controller configured to control said switch such that said battery unit connects to said fixing member heater after a sensed fixing member temperature continuously decreases during a predetermined period, wherein  
a toner image is fixed onto a recording medium while passing through said nip.

5. A toner fixing device, comprising:  
a fixing member;  
an opposite member formed opposite said fixing member so as to form a nip between said fixing member and said opposite member;  
a main power source;  
a battery unit;  
a charger connecting said battery unit to said main power source;  
a fixing member heater connected to said battery unit;  
a switch disposed between said battery unit and said fixing member heater, said switch configured to controllably connect or disconnect said battery unit and said fixing member heater;  
a fixing member temperature sensor connected to said fixing member; and  
a controller configured to control said switch such that said battery unit connects to said heater when a sensed rate of decreasing temperature exceeds a predetermined rate of decreasing temperature, wherein  
a toner image is fixed onto a recording medium while passing through said nip.

6. A toner fixing device, comprising:  
a fixing member;  
an opposite member formed opposite said fixing member so as to form a nip between said fixing member and said opposite member;  
a main power source;  
a battery unit;

a charger connecting said battery unit to said main power source;  
a fixing member heater connected to said battery unit;  
a switch disposed between said battery unit and said fixing member heater, said switch configured to controllably connect or disconnect said battery unit and said fixing member heater; and  
a controller configured to calculate a heat load based on at least one of a number and a type of recording medium passing through the nip, and to control said switch based on the calculated heat load, wherein  
a toner image is fixed onto a recording medium while passing through said nip.

7. The toner fixing device according to claim 6, further comprising:

a fixing member temperature sensor connected to said fixing member, wherein said controller further calculates said heat load based on a sensed temperature.

8. A toner fixing device, comprising:

a fixing member;

an opposite member formed opposite said fixing member so as to form a nip between said fixing member and said opposite member;

a main power source;

a battery unit configured to operate in a limited mode of operation and an unlimited mode of operation;

a charger connecting said battery unit to said main power source;

a fixing member heater connected to said battery unit; and

a controller configured to control said battery unit, wherein

a toner image is fixed onto a recording medium while passing through said nip, and

said controller controls said battery unit to operate in said limited mode of operation during a ramp-up time before fixing images onto said recording medium.

9. The toner fixing device according to claim 8, wherein

said controller controls said battery unit to operate in said unlimited mode of operation while plural recording medium continuously pass through said nip.

10. In an image forming apparatus, the improvement comprising:

a toner fixing device comprising

- a fixing member,
- an opposite member formed opposite said fixing member so as to form a nip between said fixing member and said opposite member,
- a main power source,
- an electric double-layer capacitor,
- a charger connecting said electric double-layer capacitor to said main power source,
- a fixing member heater connected to said electric double-layer capacitor,
- a switch disposed between said electric double-layer capacitor and said fixing member heater, said switch configured to controllably connect and disconnect said electric double-layer capacitor and said fixing member heater,
- a fixing member temperature sensor in contact with said fixing member, and
- a controller configured to control said switch such that said electric double-layer capacitor connects to or disconnects from said heater based on comparing a temperature sensed by said fixing member temperature sensor to a temperature threshold value, wherein
- a toner image is fixed onto a recording medium passing through said nip.

11. In an image forming apparatus, the improvement comprising:

a toner fixing device comprising

- a fixing member,
- an opposite member formed opposite said fixing member so as to form a nip between said fixing member and said opposite member,
- a main power source,
- a battery unit,
- a charger connecting said battery unit to said main power source,
- a fixing member heater connected to said battery unit,
- a switch disposed between said battery unit and said fixing member heater, said switch configured to controllably connect or disconnect said battery unit and said fixing member heater,
- a fixing member temperature sensor connected to said fixing member, and
- a controller configured to control said switch such that said battery unit connects to said fixing member heater after a sensed fixing member temperature continuously decreases during a predetermined period, wherein

a toner image is fixed onto a recording medium while passing through said nip.

12. In an image forming apparatus, the improvement comprising:

a toner fixing device comprising

a fixing member,

an opposite member formed opposite said fixing member so as to form a nip between said fixing member and said opposite member,

a main power source,

a battery unit,

a charger connecting said battery unit to said main power source,

a fixing member heater connected to said battery unit,

a switch disposed between said battery unit and said fixing member heater, said switch configured to controllably connect or disconnect said battery unit and said fixing member heater,

a fixing member temperature sensor connected to said fixing member, and

a controller configured to control said switch such that said battery unit connects to said heater when a sensed rate of decreasing temperature exceeds a predetermined rate of decreasing temperature, wherein

a toner image is fixed onto a recording medium while passing through said nip.

13. In an image forming apparatus, the improvement comprising:

a toner fixing device comprising

a fixing member,

an opposite member formed opposite said fixing member so as to form a nip between said fixing member and said opposite member,

a main power source,

a battery unit,

a charger connecting said battery unit to said main power source,

a fixing member heater connected to said battery unit,

a switch disposed between said battery unit and said fixing member heater, said switch configured to controllably connect or disconnect said battery unit and said fixing member heater, and

a controller configured to calculate a heat load based on at least one of a number and a type of recording medium passing through the nip, and to control said switch based on the calculated heat load, wherein

a toner image is fixed onto a recording medium while passing through said nip.

14. In an image forming apparatus, the improvement comprising:

a toner fixing device comprising

a fixing member,

an opposite member formed opposite said fixing member so as to form a nip between said fixing member and said opposite member,

a main power source,

a battery unit configured to operate in a limited mode of operation and an unlimited mode of operation,

a charger connecting said battery unit to said main power source,

a fixing member heater connected to said battery unit, and

a controller configured to control said battery unit, wherein

a toner image is fixed onto a recording medium while passing through said nip, and

said controller controls said battery unit to operate in said limited mode of operation during a ramp-up time before fixing images onto said recording medium.

15. A method for fixing a toner image onto a recording medium, comprising:

charging an electric double-layer capacitor;

sensing a temperature of a toner fixing member; and

connecting and disconnecting said electric double-layer capacitor and a fixing member heater based on comparing a sensed fixing member temperature to a threshold temperature value.

16. A method for fixing a toner image onto a recording medium, comprising:

charging a battery unit from a main power source;

sensing a fixing member temperature; and

connecting and disconnecting said battery unit and a fixing member heater based on comparing a duration of decreasing sensed fixing member temperature with a threshold time

period.

17. A method for fixing a toner image onto a recording medium, comprising:  
charging a battery unit from a main power source;  
sensing a fixed member temperature; and  
connecting and disconnecting said battery and a fixing member heater based on  
comparing a rate of decreasing sensed temperature with a threshold rate of decreasing  
temperature.

18. A method for fixing a toner image onto a recording medium, comprising:  
charging a battery unit from a main power source;  
sensing a fixing member temperature;  
calculating a heat load based on at least one of a number or type of recording medium;  
and  
connecting and disconnecting said battery unit and a fixing member heater based on a  
calculated heat load.

19. A toner fixing device, comprising:  
means for charging an electric double-layer capacitor;  
means for sensing a temperature of a toner fixing member; and  
means for connecting and disconnecting said electric double-layer capacitor and a  
fixing member heater based on comparing a sensed fixing member temperature to a threshold  
temperature value.

20. A toner fixing device, comprising:  
means for charging a battery unit from a main power source;  
means for sensing a fixing member temperature; and  
means for connecting and disconnecting said battery unit and a fixing member heater  
based on comparing a duration of decreasing sensed fixing member temperature with a  
threshold time period.

21. A toner fixing device, comprising:  
means for charging a battery unit from a main power source;  
means for sensing a fixing member temperature; and

means for connecting and disconnecting said battery and a fixing member heater based on comparing a rate of decreasing sensed temperature with a threshold rate of decreasing temperature.

22. A toner fixing device, comprising:

means for charging a battery unit from a main power source;

means for sensing a fixing member temperature;

means for calculating a heat load based on at least one of a number or type of recording medium; and

means for connecting and disconnecting said battery unit and a fixing member heater based on a calculated heat load.